



Selected Acquisition Report (SAR)

RCS: DD-A&T(Q&A)823-289



Tactical Tomahawk RGM-109E/UGM-109E Missile (TACTOM)

As of FY 2017 President's Budget

Defense Acquisition Management
Information Retrieval
(DAMIR)

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Common Acronyms and Abbreviations for MDAP Programs

Acq O&M - Acquisition-Related Operations and Maintenance
ACAT - Acquisition Category
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
\$B - Billions of Dollars
BA - Budget Authority/Budget Activity
Blk - Block
BY - Base Year
CAPE - Cost Assessment and Program Evaluation
CARD - Cost Analysis Requirements Description
CDD - Capability Development Document
CLIN - Contract Line Item Number
CPD - Capability Production Document
CY - Calendar Year
DAB - Defense Acquisition Board
DAE - Defense Acquisition Executive
DAMIR - Defense Acquisition Management Information Retrieval
DoD - Department of Defense
DSN - Defense Switched Network
EMD - Engineering and Manufacturing Development
EVM - Earned Value Management
FOC - Full Operational Capability
FMS - Foreign Military Sales
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
IOC - Initial Operational Capability
Inc - Increment
JROC - Joint Requirements Oversight Council
\$K - Thousands of Dollars
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
\$M - Millions of Dollars
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
O&S - Operating and Support
PAUC - Program Acquisition Unit Cost

PB - President's Budget
PE - Program Element
PEO - Program Executive Officer
PM - Program Manager
POE - Program Office Estimate
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
SCP - Service Cost Position
TBD - To Be Determined
TY - Then Year
UCR - Unit Cost Reporting
U.S. - United States
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)

Program Information

Program Name

Tactical Tomahawk RGM-109E/UGM-109E Missile (TACTOM)

DoD Component

Navy

Responsible Office

CAPT Mark Johnson
Program Executive Office
Unmanned Aviation and Strike Weapons
47123 Buse Rd., Bldg. 2272, Rm. 247
Patuxent River, MD 20670-1547

Phone: 301-757-6408
Fax: 301-757-6412
DSN Phone: 757-6408
DSN Fax:
Date Assigned: September 18, 2015

mark.e.johnson@navy.mil

References

SAR Baseline (Production Estimate)

Navy Acquisition Executive (NAE) Approved Acquisition Program Baseline (APB) dated August 3, 2004

Approved APB

Navy Acquisition Executive (NAE) Approved Acquisition Program Baseline (APB) dated April 11, 2011

Mission and Description

The Tactical Tomahawk RGM-109E/UGM-109E Missile (TACTOM) counters threats against United States Forces by destroying fixed and mobile targets, which include command, control and logistic systems, industrial and other high value targets, and fixed and mobile defense systems. The Tomahawk Weapons System (TWS) consists of the TACTOM missile, the Tomahawk Mission Planning Center (TMPC), and the Tactical Tomahawk Weapons Control System (TTWCS). TACTOM is an ACAT IC program, TMPC is an ACAT II program, and TTWCS is an ACAT III program. TACTOM provides major modernization to the existing Tomahawk technology by increasing responsiveness and flexibility at a more affordable production unit cost.

Key elements of the TACTOM design are an improved navigation and guidance computer, improved anti-jam Global Positioning System capability, improved responsiveness and flexibility through two-way satellite communications for in-flight re-targeting, a loiter capability, and the ability to send a single-frame Battle Damage Indication Image of over-flown areas prior to impact. Modern manufacturing techniques and Commercial Off-the-Shelf/Government Off-the-Shelf hardware provide this improved capability. Additionally, the life cycle costs are significantly reduced by extending the recertification interval from eight years for the currently fielded Block III Tomahawk to 15 years for TACTOM. TACTOM will maximize the use of existing TWS program and logistic support.

Executive Summary

Program Highlights Since Last Report:

TACTOM has exercised 12 FRP contracts to date, the most recent occurring in FY 2015. The FY 2015 FRP 12 was awarded for a total of 214, which includes 196 surface FY 2015 All-Up-Round (AUR) missiles and 18 surface FY 2014 Buy-to-Budget AUR missiles.

As of February 9, 2016, a total of 3,636 TACTOM missiles have been delivered, which includes 79 FMS missiles for the United Kingdom (UK).

The FY 2015 Overseas Contingency Operations (OCO) supplemental funds appropriated by Congress to replenish 47 TACTOM missiles, fired during Operation Inherent Resolve (OIR), will be procured with the FY 2016 production contract (due to maximum quantity constraints on the FY 2015 contract).

TACTOM deliveries by Raytheon Missile Systems (RMS), Tucson, Arizona, are consistently ahead of contract delivery schedule. As of February 9, 2016, RMS achieved 79 consecutive months of meeting or exceeding the contracted TACTOM missile delivery requirements. The current combined Block III Tomahawk and TACTOM fleet inventory is sufficient to satisfy projected calendar year 2016 U.S. Navy operational load-outs.

Procurement of new missiles has been suspended beginning in FY 2018, three years earlier than the APB dated April 11, 2011. The Department of the Navy will continue to reassess production throughout the FYDP.

The program continues to focus on hardware obsolescence, product improvement and modernization opportunities to meet existing requirements, ensure continued weapons system viability, and keep pace with evolving threats. Initial modernization efforts would be associated with communication upgrades to enable missile communications in non-permissive environments.

There are no significant software-related issues with this program at this time.

History of Significant Developments Since Program Initiation:

June 1998: Milestone II development Contract Award.

August 2002: First Development Flight Test successfully completed.

October 3, 2002: LRIP-1 contract awarded for 25 missiles.

January 14, 2003: LRIP-2 contract awarded for 167 missiles.

October 2003: Technical Evaluation completed.

March 2004: Successful Operational Evaluation (OPEVAL) completed. OPEVAL included two surface and two underwater test launches, numerous mission planning exercises and a complete 96-hour end-to-end operational scenario.

March 4, 2004: LRIP-3 contract awarded for 210 missiles. Late in FY 2003, a Congressional plus-up provided for an LRIP-3 procurement to accelerate the replenishment of inventory lost during Operation Iraqi Freedom.

May 2004: IOC achieved.

August 3, 2004: Entered the Production and Deployment Phase based on Milestone III ADM issued by the Assistant Secretary of the Navy (Research, Development, and Acquisition).

August 11, 2004: Operational Requirements Document for Tomahawk Weapons Systems Baseline IV signed. TACTOM is authorized in Chapter 2 of this system level document.

August 18, 2004: FRP contract awarded. A Multi-Year Procurement contract (FY 2004-FY 2008) was signed with Raytheon Missile Systems for a base plus four options, for up to 2200 Block IV Tactical Tomahawk AUR missiles.

September 16, 2004: An in depth Production Verification Test of randomly selected Block IV Tactical Tomahawk AUR LRIP missile was successfully completed at the Naval Surface Weapons Center, Indian Head Division.

March 31, 2009: FRP Contract awarded for base year plus two options, for up to 1050 Block IV Tactical Tomahawk AUR missiles.

September 13, 2011: Additional FY 2011 funding was received through OMNIBUS reprogramming action to replenish the 221 Tomahawk missile expenditures during Operation Odyssey Dawn.

June 7, 2012: FRP Contract awarded for base year plus one option to procure up to 740 Block IV Tactical Tomahawk AUR missiles.

September 2014: During Operation Inherent Resolve (OIR), the U.S. Navy fired 47 TACTOM missiles from aboard the USS Arleigh Burke and USS Philippine Sea. Additional FY 2015 OCO supplemental funds were appropriated by Congress for the replenishment of those combat expenditures.

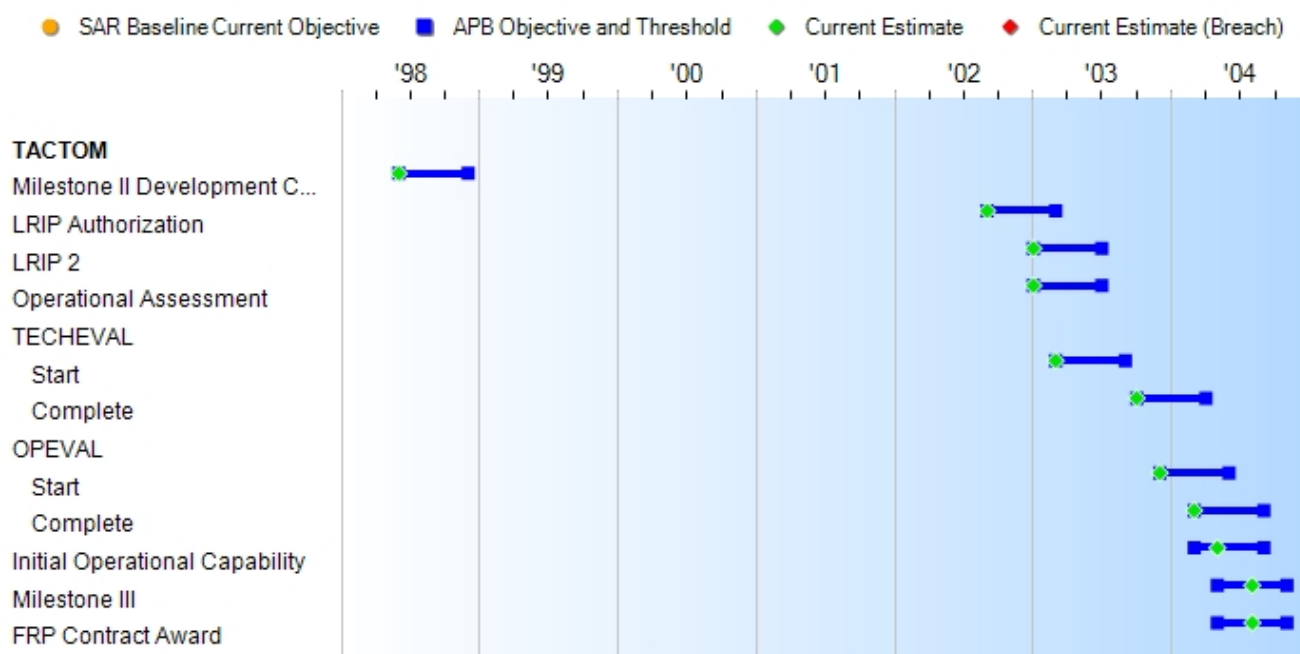
September 24, 2014: FRP contract award for 231 Block IV Tactical Tomahawk AUR missiles. The FY 2014 procurement includes 196 surface and subsurface launched AURs, 20 Torpedo Tube Launched AURs as part of the UK FMS Case, and 15 surface AURs (FY 2013 funded through Buy-to-Budget). The FY 2015 option includes 96 surface AURs and ten surface AURs (FY 2014 funded through Buy-to-Budget).

September 24, 2014: Contract awarded for FRP-11 (231 missiles), and FRP-12 (214 missiles). All deliveries are scheduled from November 2015 to August 2017.

Threshold Breaches

APB Breaches			Explanation of Breach
Schedule		<input type="checkbox"/>	The TACTOM RDT&E increases are associated with the revised funding estimates for the Anti-Access/Area Denial software development, hardware development, systems engineering, integration, system testing, and transition documentation to incorporate baseline improvements during mid-life recertification commencing in FY 2019.
Performance		<input type="checkbox"/>	
Cost	RDT&E	<input checked="" type="checkbox"/>	
	Procurement	<input type="checkbox"/>	
	MILCON	<input type="checkbox"/>	
	Acq O&M	<input type="checkbox"/>	A Program Deviation Letter (PDR) was submitted to ASN(RDA) on February 10, 2016. An updated ABP will be submitted within 90 days.
O&S Cost		<input type="checkbox"/>	
Unit Cost	PAUC	<input type="checkbox"/>	
	APUC	<input type="checkbox"/>	
Nunn-McCurdy Breaches			
Current UCR Baseline			
	PAUC	None	
	APUC	None	
Original UCR Baseline			
	PAUC	None	
	APUC	None	

Schedule



Schedule Events				
Events	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate
Milestone II Development Contract Award	Jun 1998	Jun 1998	Dec 1998	Jun 1998
LRIP Authorization	Sep 2002	Sep 2002	Mar 2003	Sep 2002
LRIP 2	Jan 2003	Jan 2003	Jul 2003	Jan 2003
Operational Assessment	Jan 2003	Jan 2003	Jul 2003	Jan 2003
TECHEVAL				
Start	Mar 2003	Mar 2003	Sep 2003	Mar 2003
Complete	Oct 2003	Oct 2003	Apr 2004	Oct 2003
OPEVAL				
Start	Dec 2003	Dec 2003	Jun 2004	Dec 2003
Complete	Mar 2004	Mar 2004	Sep 2004	Mar 2004
Initial Operational Capability	Mar 2004	Mar 2004	Sep 2004	May 2004
Milestone III	May 2004	May 2004	Nov 2004	Aug 2004
FRP Contract Award	May 2004	May 2004	Nov 2004	Aug 2004

Change Explanations

None

Acronyms and Abbreviations

OPEVAL - Operational Evaluation

TECHEVAL - Technical Evaluation

Performance

Performance Characteristics					
SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Demonstrated Performance	Current Estimate	
MR (%)					
.90	.90	.86	.92	.92	(Ch-1)
CR (%)					
.96	.96	.94	.97	.97	(Ch-1)

Classified Performance information is provided in the classified annex to this submission.

Requirements Reference

Operational Requirements Document (ORD) #641-76-04 dated August 11, 2004

Change Explanations

(Ch-1) MR decreased from .93 to .92 from the previous 2014 SAR due to the inclusion of results from Operation Inherent Resolve (OIR). CR decreased from .99 to .97 from the previous 2014 SAR due to the inclusion of results from OIR.

Notes

The data set for Cruise Reliability (CR) and Mission Reliability (MR) includes TACTOM Flight Tests, combat expenditures, and accounting for corrective actions in the missile inventory. Test events include Operational Evaluation, Technical Evaluation, TACTOM Penetrating Vehicle flights, contractor flights, ground tests, and combat expenditures. Corrected failures that meet all of the following criteria have been removed from the data set: root cause of a failure is known, the failure mode is eliminated by hardware or software modification, the modification has been appropriately verified by test, and the modification has been implemented throughout the entire missile population.

Acronyms and Abbreviations

CR - Cruise Reliability
MR - Mission Reliability
OIR - Operation Inherent Resolve

Track to Budget

RDT&E

Appn	BA	PE
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Navy 1319 07 0204229N

Project	Name
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0545 Tomahawk Mssn Planning Ctr (Shared)

Notes: Current Estimate includes RDT&E funding for modernization efforts in FY 2014 - FY 2020 to mitigate navigation and communication obsolescence.

2658 Tomahawk Mssn Planning Ctr (Sunk)

2659 Tomahawk Mssn Planning Ctr (Sunk)

Notes

RDT&E funding for TACTOM modernization is a subset of the total RDT&E funding within PE 0204229N.

Procurement

Appn	BA	PE
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Navy 1507 02 0204229N

Line Item	Name
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2101 TOMAHAWK (Shared)

Notes: TACTOM

Cost and Funding

Cost Summary

Total Acquisition Cost							
Appropriation	BY 1999 \$M			BY 1999 \$M	TY \$M		
	SAR Baseline Production Estimate	Current APB Production Objective/Threshold		Current Estimate	SAR Baseline Production Estimate	Current APB Production Objective	Current Estimate
RDT&E	564.9	564.9	621.4	623.7 ¹	581.0	581.9	663.1
Procurement	2412.4	4962.6	5458.8	4501.1	2709.3	6303.5	5727.3
Flyaway	--	--	--	4412.8	--	--	5616.3
Recurring	--	--	--	3956.0	--	--	4880.9
Non Recurring	--	--	--	456.8	--	--	735.4
Support	--	--	--	88.3	--	--	111.0
Other Support	--	--	--	88.3	--	--	111.0
Initial Spares	--	--	--	0.0	--	--	0.0
MILCON	0.0	0.0	--	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	--	0.0	0.0	0.0	0.0
Total	2977.3	5527.5	N/A	5124.8	3290.3	6885.4	6390.4

¹ APB Breach

Confidence Level

Confidence Level of cost estimate for current APB: 51%

The estimate to support this program, like most cost estimates, is built upon a product-oriented work breakdown structure based on historical actual cost information to the maximum extent possible, and, most importantly, based on conservative assumptions that are consistent with actual demonstrated contractor and government performance for a series of acquisition programs in which we have been successful.

Total Quantity			
Quantity	SAR Baseline Production Estimate	Current APB Production	Current Estimate
RDT&E	10	10	10
Procurement	2780	4730	4215
Total	2790	4740	4225

Cost and Funding

Funding Summary

Appropriation Summary									
FY 2017 President's Budget / December 2015 SAR (TY\$ M)									
Appropriation	Prior	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	To Complete	Total
RDT&E	594.5	20.2	22.7	16.6	4.9	4.2	0.0	0.0	663.1
Procurement	4633.2	202.3	186.9	37.7	37.0	38.0	38.8	553.4	5727.3
MILCON	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Acq O&M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
PB 2017 Total	5227.7	222.5	209.6	54.3	41.9	42.2	38.8	553.4	6390.4
PB 2016 Total	5225.8	197.4	45.5	56.8	44.5	44.7	0.0	0.0	5614.7
Delta	1.9	25.1	164.1	-2.5	-2.6	-2.5	38.8	553.4	775.7

Quantity Summary										
FY 2017 President's Budget / December 2015 SAR (TY\$ M)										
Quantity	Undistributed	Prior	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	To Complete	Total
Development	10	0	0	0	0	0	0	0	0	10
Production	0	3966	149	100	0	0	0	0	0	4215
PB 2017 Total	10	3966	149	100	0	0	0	0	0	4225
PB 2016 Total	10	3958	100	0	0	0	0	0	0	4068
Delta	0	8	49	100	0	0	0	0	0	157

Cost and Funding

Annual Funding By Appropriation

Annual Funding							
1319 RDT&E Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
1998	--	--	--	--	--	--	49.8
1999	--	--	--	--	--	--	122.4
2000	--	--	--	--	--	--	164.2
2001	--	--	--	--	--	--	105.4
2002	--	--	--	--	--	--	63.0
2003	--	--	--	--	--	--	57.3
2004	--	--	--	--	--	--	19.8
2005	--	--	--	--	--	--	--
2006	--	--	--	--	--	--	--
2007	--	--	--	--	--	--	--
2008	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	--
2010	--	--	--	--	--	--	--
2011	--	--	--	--	--	--	--
2012	--	--	--	--	--	--	--
2013	--	--	--	--	--	--	--
2014	--	--	--	--	--	--	2.4
2015	--	--	--	--	--	--	10.2
2016	--	--	--	--	--	--	20.2
2017	--	--	--	--	--	--	22.7
2018	--	--	--	--	--	--	16.6
2019	--	--	--	--	--	--	4.9
2020	--	--	--	--	--	--	4.2
Subtotal	10	--	--	--	--	--	663.1

Annual Funding							
1319 RDT&E Research, Development, Test, and Evaluation, Navy							
Fiscal Year	Quantity	BY 1999 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
1998	--	--	--	--	--	--	49.9
1999	--	--	--	--	--	--	121.3
2000	--	--	--	--	--	--	160.3
2001	--	--	--	--	--	--	101.5
2002	--	--	--	--	--	--	60.1
2003	--	--	--	--	--	--	53.9
2004	--	--	--	--	--	--	18.1
2005	--	--	--	--	--	--	--
2006	--	--	--	--	--	--	--
2007	--	--	--	--	--	--	--
2008	--	--	--	--	--	--	--
2009	--	--	--	--	--	--	--
2010	--	--	--	--	--	--	--
2011	--	--	--	--	--	--	--
2012	--	--	--	--	--	--	--
2013	--	--	--	--	--	--	--
2014	--	--	--	--	--	--	1.8
2015	--	--	--	--	--	--	7.6
2016	--	--	--	--	--	--	14.8
2017	--	--	--	--	--	--	16.4
2018	--	--	--	--	--	--	11.7
2019	--	--	--	--	--	--	3.4
2020	--	--	--	--	--	--	2.9
Subtotal	10	--	--	--	--	--	623.7

Annual Funding 1507 Procurement Weapons Procurement, Navy							
Fiscal Year	Quantity	TY \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2002	25	45.7	--	24.0	69.7	2.4	72.1
2003	377	420.5	--	13.7	434.2	2.9	437.1
2004	322	344.5	--	--	344.5	7.4	351.9
2005	298	268.5	--	--	268.5	8.7	277.2
2006	409	362.7	--	--	362.7	9.9	372.6
2007	355	343.3	--	--	343.3	7.7	351.0
2008	496	469.1	--	--	469.1	5.0	474.1
2009	207	274.5	--	--	274.5	5.0	279.5
2010	196	268.0	--	--	268.0	6.3	274.3
2011	417	541.3	--	--	541.3	7.1	548.4
2012	196	266.5	--	--	266.5	9.9	276.4
2013	211	287.8	--	--	287.8	5.8	293.6
2014	214	301.4	--	--	301.4	6.1	307.5
2015	243	310.9	--	--	310.9	6.6	317.5
2016	149	195.5	--	--	195.5	6.8	202.3
2017	100	180.7	--	--	180.7	6.2	186.9
2018	--	--	--	34.7	34.7	3.0	37.7
2019	--	--	--	36.0	36.0	1.0	37.0
2020	--	--	--	36.4	36.4	1.6	38.0
2021	--	--	--	37.2	37.2	1.6	38.8
2022	--	--	--	55.6	55.6	--	55.6
2023	--	--	--	56.4	56.4	--	56.4
2024	--	--	--	57.2	57.2	--	57.2
2025	--	--	--	58.1	58.1	--	58.1
2026	--	--	--	49.8	49.8	--	49.8
2027	--	--	--	41.0	41.0	--	41.0
2028	--	--	--	43.9	43.9	--	43.9
2029	--	--	--	42.7	42.7	--	42.7
2030	--	--	--	45.2	45.2	--	45.2
2031	--	--	--	44.4	44.4	--	44.4
2032	--	--	--	33.1	33.1	--	33.1
2033	--	--	--	22.3	22.3	--	22.3
2034	--	--	--	3.7	3.7	--	3.7
Subtotal	4215	4880.9	--	735.4	5616.3	111.0	5727.3

Annual Funding 1507 Procurement Weapons Procurement, Navy							
Fiscal Year	Quantity	BY 1999 \$M					
		End Item Recurring Flyaway	Non End Item Recurring Flyaway	Non Recurring Flyaway	Total Flyaway	Total Support	Total Program
2002	25	43.0	--	22.6	65.6	2.3	67.9
2003	377	388.1	--	12.6	400.7	2.7	403.4
2004	322	308.8	--	--	308.8	6.6	315.4
2005	298	234.2	--	--	234.2	7.6	241.8
2006	409	308.6	--	--	308.6	8.4	317.0
2007	355	285.9	--	--	285.9	6.4	292.3
2008	496	384.5	--	--	384.5	4.1	388.6
2009	207	221.8	--	--	221.8	4.1	225.9
2010	196	212.9	--	--	212.9	5.0	217.9
2011	417	422.0	--	--	422.0	5.5	427.5
2012	196	204.7	--	--	204.7	7.6	212.3
2013	211	217.9	--	--	217.9	4.4	222.3
2014	214	225.1	--	--	225.1	4.6	229.7
2015	243	228.8	--	--	228.8	4.8	233.6
2016	149	141.4	--	--	141.4	4.9	146.3
2017	100	128.3	--	--	128.3	4.4	132.7
2018	--	--	--	24.1	24.1	2.1	26.2
2019	--	--	--	24.6	24.6	0.7	25.3
2020	--	--	--	24.3	24.3	1.1	25.4
2021	--	--	--	24.5	24.5	1.0	25.5
2022	--	--	--	35.8	35.8	--	35.8
2023	--	--	--	35.6	35.6	--	35.6
2024	--	--	--	35.4	35.4	--	35.4
2025	--	--	--	35.2	35.2	--	35.2
2026	--	--	--	29.6	29.6	--	29.6
2027	--	--	--	23.9	23.9	--	23.9
2028	--	--	--	25.1	25.1	--	25.1
2029	--	--	--	23.9	23.9	--	23.9
2030	--	--	--	24.8	24.8	--	24.8
2031	--	--	--	23.9	23.9	--	23.9
2032	--	--	--	17.5	17.5	--	17.5
2033	--	--	--	11.5	11.5	--	11.5
2034	--	--	--	1.9	1.9	--	1.9
Subtotal	4215	3956.0	--	456.8	4412.8	88.3	4501.1

Low Rate Initial Production

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	4/12/2001	8/26/2003
Approved Quantity	25	402
Reference	LRIP ADM	LRIP III Acquisition Strategy Report/Acquisition Plan (ASR/AP)
Start Year	2002	2002
End Year	2005	2007

Authority to act on LRIP-3 was granted by the Assistant Secretary of the Navy for Research, Development, and Acquisition on August 26, 2003, by way of a signed ASR/AP, vice an ADM. This ASR/AP served to support the FY 2003 Emergency Supplemental funding for 210 TACTOM All-Up-Round LRIP missiles to increase the total LRIP quantity to 402 missiles. Urgency was due to Operation Iraqi Freedom and the expenditure of a large number of Block III Tomahawk Missiles.

Foreign Military Sales

Country	Date of Sale	Quantity	Total Cost \$M	Description
United Kingdom	9/24/2014	20	26.6	Torpedo Tube Launch (TTL) TACTOM missiles were purchased in FY 2014; cost includes missiles and ancillary equipment. All United Kingdom (UK) missiles are scheduled to be delivered by 2nd Quarter 2016.
United Kingdom	3/11/2013	4	5.7	TTL TACTOM missiles were purchased in FY 2013; cost includes missiles and ancillary equipment. All UK missiles on contract have been delivered.
United Kingdom	2/10/2006	65	64.0	TTL TACTOM missiles were purchased in FY 2006; cost includes missiles and ancillary equipment. All UK missiles on contract have been delivered.

Notes

In October 2014, the UK submitted a Letter of Request (LOR) to procure 65 TACTOM TTL All-Up-Rounds (AUR) from United States Navy (USN) stock starting in FY 2015. A Letter of Offer and Acceptance (LOA) for 20 of the 65 AURs was signed by the UK in March 2015. Ownership of the 20 AURs has been transferred to the UK. PMA-280 has worked with the Comptroller and other Naval Air Systems Command (NAVAIR) competencies to establish a Replacement Program. The FMS funds associated with the 20 assets that have been sold to the UK have been reprogrammed to Weapon Procurement Navy (WPN). The WPN funds will be utilized for a USN TACTOM missile procurement starting in FY 2016.

Acronyms and Abbreviations

AUR - All-Up-Round
 LOA - Letter of Acceptance
 LOR - Letter of Request
 NAVAIR - Naval Systems Air Command
 TTL - Torpedo Tube Launch
 UK - United Kingdom
 USN - United States Navy
 WPN - Weapon Procurement Navy

Nuclear Costs

None

Unit Cost

Unit Cost Report

Item	BY 1999 \$M	BY 1999 \$M	% Change
	Current UCR Baseline (Apr 2011 APB)	Current Estimate (Dec 2015 SAR)	

Program Acquisition Unit Cost

Cost	5527.5	5124.8	
Quantity	4740	4225	
Unit Cost	1.166	1.213	+4.03

Average Procurement Unit Cost

Cost	4962.6	4501.1	
Quantity	4730	4215	
Unit Cost	1.049	1.068	+1.81

Item	BY 1999 \$M	BY 1999 \$M	% Change
	Original UCR Baseline (Sep 1999 APB)	Current Estimate (Dec 2015 SAR)	

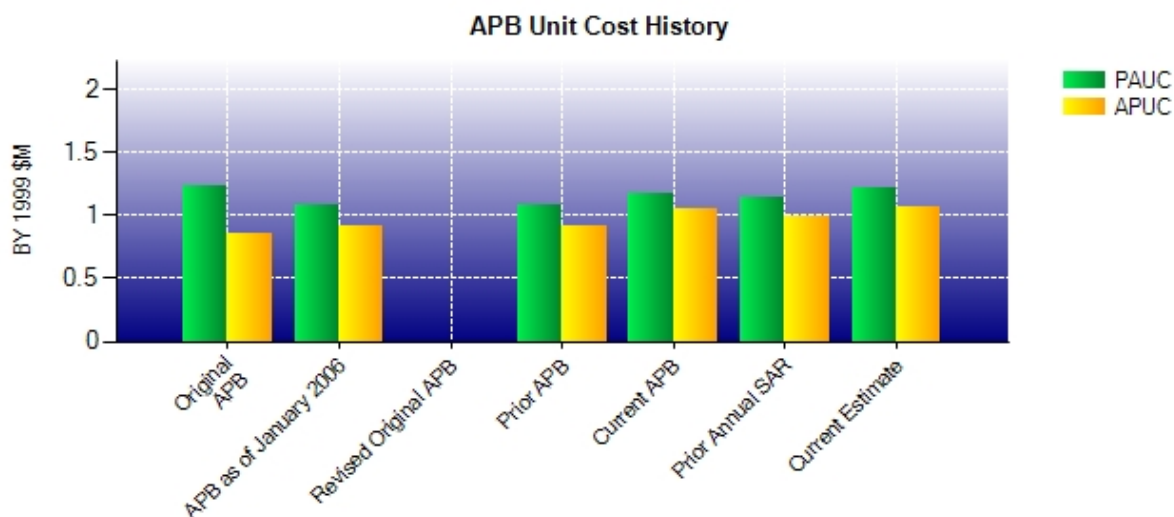
Program Acquisition Unit Cost

Cost	1683.7	5124.8	
Quantity	1365	4225	
Unit Cost	1.233	1.213	-1.62

Average Procurement Unit Cost

Cost	1158.4	4501.1	
Quantity	1353	4215	
Unit Cost	0.856	1.068	+24.77

Unit Cost History



Item	Date	BY 1999 \$M		TY \$M	
		PAUC	APUC	PAUC	APUC
Original APB	Sep 1999	1.233	0.856	1.365	0.984
APB as of January 2006	Apr 2005	1.076	0.913	1.237	1.069
Revised Original APB	N/A	N/A	N/A	N/A	N/A
Prior APB	Apr 2005	1.076	0.913	1.237	1.069
Current APB	Apr 2011	1.166	1.049	1.453	1.333
Prior Annual SAR	Dec 2014	1.140	0.991	1.380	1.222
Current Estimate	Dec 2015	1.213	1.068	1.513	1.359

SAR Unit Cost History

Initial SAR Baseline to Current SAR Baseline (TY \$M)									
Initial PAUC Development Estimate	Changes								PAUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
1.365	-0.015	0.324	0.117	0.000	-0.716	0.000	0.104	-0.186	1.179

Current SAR Baseline to Current Estimate (TY \$M)									
PAUC Production Estimate	Changes								PAUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
1.179	0.025	-0.173	0.062	0.016	0.388	0.000	0.016	0.334	1.513

Initial SAR Baseline to Current SAR Baseline (TY \$M)									
Initial APUC Development Estimate	Changes								APUC Production Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
0.984	-0.015	0.325	0.097	0.000	-0.520	0.000	0.104	-0.009	0.975

Current SAR Baseline to Current Estimate (TY \$M)									
APUC Production Estimate	Changes								APUC Current Estimate
	Econ	Qty	Sch	Eng	Est	Oth	Spt	Total	
0.975	0.025	-0.104	0.062	0.016	0.369	0.000	0.016	0.384	1.359

SAR Baseline History				
Item	SAR Planning Estimate	SAR Development Estimate	SAR Production Estimate	Current Estimate
Milestone I	N/A	N/A	N/A	N/A
Milestone II	N/A	Jun 1998	Jun 1998	Jun 1998
Milestone III	N/A	Jun 2003	May 2004	Aug 2004
IOC	N/A	Apr 2003	Mar 2004	May 2004
Total Cost (TY \$M)	N/A	1863.4	3290.3	6390.4
Total Quantity	N/A	1365	2790	4225
PAUC	N/A	1.365	1.179	1.513

Cost Variance

Summary TY \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	581.0	2709.3	--	3290.3
Previous Changes				
Economic	--	+112.3	--	+112.3
Quantity	--	+853.1	--	+853.1
Schedule	--	+251.1	--	+251.1
Engineering	--	+63.2	--	+63.2
Estimating	+73.6	+913.7	--	+987.3
Other	--	--	--	--
Support	--	+57.4	--	+57.4
Subtotal	+73.6	+2250.8	--	+2324.4
Current Changes				
Economic	-0.1	-7.6	--	-7.7
Quantity	--	+105.5	--	+105.5
Schedule	--	+11.8	--	+11.8
Engineering	--	+3.1	--	+3.1
Estimating	+8.6	+643.7	--	+652.3
Other	--	--	--	--
Support	--	+10.7	--	+10.7
Subtotal	+8.5	+767.2	--	+775.7
Total Changes	+82.1	+3018.0	--	+3100.1
CE - Cost Variance	663.1	5727.3	--	6390.4
CE - Cost & Funding	663.1	5727.3	--	6390.4

Summary BY 1999 \$M				
Item	RDT&E	Procurement	MILCON	Total
SAR Baseline (Production Estimate)	564.9	2412.4	--	2977.3
Previous Changes				
Economic	--	--	--	--
Quantity	--	+630.8	--	+630.8
Schedule	--	+205.1	--	+205.1
Engineering	--	+46.1	--	+46.1
Estimating	+52.3	+680.1	--	+732.4
Other	--	--	--	--
Support	--	+47.0	--	+47.0
Subtotal	+52.3	+1609.1	--	+1661.4
Current Changes				
Economic	--	--	--	--
Quantity	--	+74.6	--	+74.6
Schedule	--	+8.5	--	+8.5
Engineering	--	+2.2	--	+2.2
Estimating	+6.5	+386.6	--	+393.1
Other	--	--	--	--
Support	--	+7.7	--	+7.7
Subtotal	+6.5	+479.6	--	+486.1
Total Changes	+58.8	+2088.7	--	+2147.5
CE - Cost Variance	623.7	4501.1	--	5124.8
CE - Cost & Funding	623.7	4501.1	--	5124.8

Previous Estimate: December 2014

RDT&E	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-0.1
Revised estimate to reflect updated Anti-Access/Area Denial estimates which include: software development, hardware development, systems engineering, integration, system testing, and transition documentation. (Estimating)	+6.5	+8.6
RDT&E Subtotal	+6.5	+8.5

Procurement	\$M	
Current Change Explanations	Base Year	Then Year
Revised escalation indices. (Economic)	N/A	-7.6
Quantity variance resulting from an increase of 157 TACTOM missiles from 4,058 to 4,215. (Subtotal)	+146.6	+205.1
Quantity variance resulting from an increase of 157 TACTOM missiles from 4,058 to 4,215. (Quantity)	(+105.4)	(+147.5)
Allocation to Schedule resulting from Quantity change. (Schedule) (QR)	(+8.4)	(+11.7)
Allocation to Engineering resulting from Quantity change. (Engineering) (QR)	(+2.2)	(+3.1)
Allocation to Estimating resulting from Quantity change. (Estimating) (QR)	(+30.6)	(+42.8)
Additional Quantity Variance due to the procurement of 49 additional missiles in FY 2016 and 100 additional TACTOM missiles in FY 2017. (Quantity)	-30.8	-42.0
Schedule Variance resulting from an increase of 8 TACTOM missiles in FY 2014 and 49 TACTOM missiles in FY 2016. (Schedule)	0.0	-0.4
Additional Schedule Variance resulting from an increase of 8 TACTOM missiles in FY 2014 added through Buy-to-Budget authority. (Schedule)	-7.4	-9.9
Additional Schedule Variance resulting from addition of 49 TACTOM missiles in FY 2016, returning program to Minimum Sustaining Rate. (Schedule)	+7.5	+10.4
Increase due to revised obsolescence activities in FY 2015 and FY 2016 due to production restoral in FY 2017. (Estimating)	+5.8	+7.9
Reduction to obsolescence to account for increased MK14 canister procurement in FY 2014 due to increased Buy-to-Budget quantities. (Estimating)	-0.7	-1.0
Increase due to the inclusion of modernization kits FY 2021 - FY 2034. (Estimating)	+348.6	+590.6
Revised estimate of production line shutdown costs FY 2016 - FY 2019 due to the inclusion of TACTOM missile production in FY 2017. (Estimating)	-5.1	-6.4
Increase due to revised cost estimate of MK14 canisters associated with additional TACTOM missiles in FY 2016 and FY 2017. (Estimating)	+10.1	+14.1
Revised estimate to reflect actuals. (Estimating)	-0.4	-0.5
Increase due to production support costs associated with production of TACTOM missiles in FY 2017. (Estimating) (QR)	+14.5	+20.5
Decrease due to FY 2016 Congressional reduction for production support funding carryover. (Estimating)	-1.5	-2.1
Revised estimate of modernization kits in FY 2018 and FY 2019 to account for the inclusion of production in FY 2017. Revised estimate of modernization kits in FY 2020 due to Navy Working Capital Fund rate change. (Estimating)	-17.9	-25.8
Decrease due to reduction in negotiated TACTOM missile hardware cost. (Estimating)	-2.6	-3.6
Increase due to revised cost estimate of MK14 canisters associated with 8 additional	+0.6	+1.0

TACTOM missiles in FY 2014 obtained through Buy-to-Budget authority. (Estimating)		
Increase in Other Support due to the addition of Range Safety System kits in Support Costs in FY 2016 - FY 2018. (Subtotal)	+7.6	+10.5
Increase in Other Support due to the inclusion of 157 TACTOM Missiles. (Support)	(+1.2)	(+1.6)
Increase in Other Support due to the addition of Range Safety System kits in Support Costs in FY 2016 - FY 2018. (Support)	(+6.4)	(+8.9)
Adjustment for current and prior escalation. (Estimating)	+4.6	+6.2
Adjustment for current and prior escalation. (Support)	+0.1	+0.2
Procurement Subtotal	+479.6	+767.2
(QR) Quantity Related		

Contracts

Contract Identification

Appropriation: Procurement
Contract Name: BLK IV TACTOM FRP FY14-15
Contractor: Raytheon Missile Systems
Contractor Location: 1151 East Hermans Road
 Tucson, AZ 85747
Contract Number: N00019-14-C-0075
Contract Type: Firm Fixed Price (FFP)
Award Date: September 24, 2014
Definitization Date: September 24, 2014

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
251.1	N/A	231	512.3	N/A	331	539.0	539.0

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the award of the Composite Capsule Launching System (CCLS), and an option exercise for 100 surface launched All-Up-Rounds.

Cost and Schedule Variance Explanations

Cost and Schedule Variance reporting is not required on this (FFP) contract.

Notes

The FY 2014 base contract was awarded for the procurement of 231 missiles at a price of \$251.1M. The FY 2014 procurement includes 196 surface and subsurface launched All-Up-Rounds (AUR), 20 torpedo tube launched AURs as part of the United Kingdom Foreign Military Sales case, and 15 surface AURs (FY 2013 funded through Buy-to-Budget).

The FY 2015 option exercise for 100 surface AURs was awarded on January 29, 2015. A modification to this option was issued on February 26, 2015, which included 114 additional surface AURs. These missiles were funded by a mix of FY 2014 Buy-to-Budget and FY 2015 funds. This modification increased the contract by \$90,601,839.46 to \$506,979,383.46 (when awarded in February).

Current contract price includes United States Navy missiles and subsurface variant capsules.

Contract Identification

Appropriation: Procurement
Contract Name: BLK IV TACTOM FRP FY12-13
Contractor: Raytheon Missile Systems
Contractor Location: 1151 East Hermans Road
 Tucson, AZ 85747
Contract Number: N00019-12-C-2000
Contract Type: Firm Fixed Price (FFP)
Award Date: June 07, 2012
Definitization Date: June 07, 2012

Contract Price							
Initial Contract Price (\$M)			Current Contract Price (\$M)			Estimated Price At Completion (\$M)	
Target	Ceiling	Qty	Target	Ceiling	Qty	Contractor	Program Manager
337.8	N/A	361	706.0	N/A	617	710.0	710.0

Target Price Change Explanation

The difference between the Initial Contract Price Target and the Current Contract Price Target is due to the FY 2013 procurement option being exercised for an additional 252 United States Navy (USN) missiles and four United Kingdom missiles.

Cost and Schedule Variance Explanations

Cost and Schedule Variance reporting is not required on this (FFP) contract.

Notes

The FY 2012 base contract was awarded for the procurement of 361 missiles at a price of \$337.8M. The FY 2013 contract option for USN missiles was exercised in December 2012. An additional option was also exercised in March 2013 to procure four FMS missiles resulting in an increase of the total contract procurement quantity to 617 missiles (USN and FMS).

Operation Odyssey Dawn replenishment missiles were procured utilizing the FY 2012 procurement contract.

This contract is more than 90% complete; therefore, this is the final report for this contract.

Deliveries and Expenditures

Deliveries				
Delivered to Date	Planned to Date	Actual to Date	Total Quantity	Percent Delivered
Development	10	10	10	100.00%
Production	3549	3557	4215	84.39%
Total Program Quantity Delivered	3559	3567	4225	84.43%

Expended and Appropriated (TY \$M)			
Total Acquisition Cost	6390.4	Years Appropriated	19
Expended to Date	4697.7	Percent Years Appropriated	51.35%
Percent Expended	73.51%	Appropriated to Date	5450.2
Total Funding Years	37	Percent Appropriated	85.29%

The above data is current as of February 09, 2016.

As of February 9, 2016 a total of 3636 TACTOM missiles have been delivered, which includes 79 FMS missiles for the United Kingdom.

Operating and Support Cost

Cost Estimate Details

Date of Estimate:	January 20, 2016
Source of Estimate:	POE
Quantity to Sustain:	3779
Unit of Measure:	Total Quantity
Service Life per Unit:	30.00 Years
Fiscal Years in Service:	FY 2004 - FY 2049

In January 2016, the TACTOM O&S cost estimate was re-estimated to account for reduced O&M funding in the PB 2017 FYDP and data received through TACTOM missile recertification studies conducted in FY 2015.

The current cost estimate includes actual and projected cost for operation and sustainment of all 4,215 procured missiles, beginning in FY 2004, with cost estimate projections extending to FY 2049. The total service life of a TACTOM is anticipated to be 30 years, which includes the initial 15 years of warranty coverage after delivery and an additional 15 years of service life following recertification. The "Quantity to Sustain" (3,779 shown above) is the forecasted inventory anticipated to sustain beyond recertification for the second 15 years of life, which includes reductions across the life cycle for actual and projected missile expenditures. This quantity is increased from FY 2014 due to the addition of 157 missiles added in the FY 2017 PB through Congressional add and Buy-to-Budget authority. Actual O&S costs were utilized from FY 2004 through FY 2015, and revised budget estimate covers FY 2016 through FY 2049.

The average annual O&S requirement in the PB 2017 FYDP decreased from previous years, causing a decrease in the projected O&M Core requirements funding through the end of the TACTOM life cycle. The revised missile recertification quantity profile shifts recertification costs later than previous estimates, resulting in an increase in the the TY costs due to inflation.

Sustainment Strategy

The sustainment strategy includes maintenance and recertification costs of the All-Up-Round (AUR) and an Operational flight test program to track Tomahawk Weapon System performance. TACTOM Sustainment Strategy is based on the original Tomahawk Program "Wooden Round" concept, which relies upon a 15 year missile warranty, and features limited missile maintenance outside of that provided by the Original Equipment Manufacturer (OEM). The total service life of a TACTOM is anticipated to be 30 years, which includes the initial 15 years of warranty coverage after delivery and an additional 15 years of service life following recertification. The OEM operates a TACTOM depot activity and is responsible for conducting the majority of the maintenance for TACTOM, of which efforts are largely covered by the 15 year warranty. The TACTOM recertification program is scheduled to begin inducting missiles in FY 2019 (per FY 2016 PB submission). The TACTOM recertification program will continue until 3,779 missiles are recertified or expended. Organizational level maintenance is limited to visual inspections, missile inventory checks (surface only), Mode 7 alignment confidence checks (submarine only) and minor unscheduled maintenance (i.e. corrosion control). Intermediate level maintenance is limited to missile identification checks, receipt and transfer inspections, electrical continuity, and nitrogen pressure checks.

Antecedent Information

Block III Tomahawk is the antecedent system of TACTOM. Antecedent costs were derived from average annual actual cost spanning 24 years. The source of this data is the Block III Tomahawk budget. Peak inventory for Block III was 1,296 missiles. The Block III Tomahawk service life was also 30 years.

Annual O&S Costs BY1999 \$M		
Cost Element	TACTOM Average Annual Cost Per Total Quantity	Tomahawk Block III (Antecedent) Average Annual Cost Per Total Quantity
Unit-Level Manpower	0.000	0.000
Unit Operations	0.000	0.000
Maintenance	0.000	0.000
Sustaining Support	32.666	36.600
Continuing System Improvements	0.000	0.000
Indirect Support	0.000	0.000
Other	21.011	65.400
Total	53.677	102.000

Missile recertification cost (shown as "other" in the unitized cost summary above) is the estimated contract cost for the OEM to recertify the inventory, divided by 45 years. The recertification program, however, is only scheduled to last for approximately 17 of the 45 years, so the unitized recertification cost ("other") understates the expected annual cost to recertify TACTOM missiles.

In December 2015, the TACTOM recertification estimate was re-estimated to reflect data received from recertification studies conducted in 2015, and revised quantity phasing to meet budget constraints. The revision also incorporated the recertification cost of the MK45 Capsule, which was not part of the previous estimate. The total O&S cost estimate increase therefore reflects an improved understanding of the scope of the TACTOM recertification effort.

The actual number of recertifications per year may not match the procurement profile. While missiles should be returned for recertification not later than 15 years following delivery, the estimate recognizes historical budget constraints. This anticipated annual limit will cause schedule variances between optimal recertification dates and actual recertification dates, resulting in a total recertification program that will extend beyond 15 years.

Item	Total O&S Cost \$M			
	TACTOM			Tomahawk Block III (Antecedent)
	Current Production APB Objective/Threshold		Current Estimate	
Base Year	N/A	N/A	2415.5	3058.4
Then Year	N/A	N/A	4145.7	N/A

Equation to Translate Annual Cost to Total Cost

Average Annual Cost Per Total Quantity = Total O&S Cost / Inventory Service Life
\$53.677M = \$2,415.5M / 45

The unitized costs shown above are the Base Year O&S totals shown above, divided by the expected 45 years of inventory service life (FY 2004 - FY 2049).

O&S Cost Variance

Category	BY 1999 \$M	Change Explanations
Prior SAR Total O&S Estimates - Dec 2014 SAR	2522.9	
Programmatic/Planning Factors	-107.4	The total O&M funding in the PB 2017 FYDP is, on average, less than annual funding levels in previous years. This decreased the projected O&M funding levels through the remainder of the TACTOM life cycle, resulting in a decrease.
Cost Estimating Methodology	0.0	
Cost Data Update	0.0	
Labor Rate	0.0	
Energy Rate	0.0	
Technical Input	0.0	
Other	0.0	
Total Changes	-107.4	
Current Estimate	2415.5	

Disposal Estimate Details

Date of Estimate: January 20, 2016
Source of Estimate: POE
Disposal/Demilitarization Total Cost (BY 1999 \$M): Total costs for disposal of all Total Quantity are 50.1

The U.S. Army has responsibility for disposal of all ordnance.